CARBURETOR RECEIVES MORE ATTENTION THAN ANY OTHER PART OF CAR

LOW-GRADE FUEL MEANS CONSTANT CHANGE IN DEVICE

Mechanism Seems Complex to Some, But Is Really Simple.

While the modern carbureter is one of the most efficient devices auxiliary to the operation of the automobile engine, nevertheless force of circumstances has caused a widespread movement toward securing even better carburetion results than those that we already have. It is not too much to say that the carbureter is today under more careful scrutiny than any other part of the motor car.

The simple fact is that our present gasoline supply, which there seems no way of increasing, is not enough to meet the demands upon it. Of course our military needs must be met first and private car owners must take what is left over; they are doing it gladly, but at the same time the best brains of the industry are striking about for methods of making our motor fuel go further than it ever has before.

One of the obvious methods of increasing our fuel supply is to employ greater quantities of other fuel, principally heavier hydrocarbons, such as kerosene and distillates. It is the purpose in a future article to discuss some of the devices now available for using these heavier fuels and in order to lay a foundation of understanding for readers this week the article will take up some of the present carbureter designs and explain their construction and operation.

Is Really Simple.

To most car owners the carbureter probably seems a rather complicated arrangement of passages, bowls and valves, but in reality, when we come to examine the instrument in detail we find it is really simple in operation and design. There are, of course, many different makes of carbureters now on the market, but in the last analysis all of those will be found to embody certain basic principles that proclaim them descendants of the same original ancestor, and this was the Maybach carbureter.

This device consisted simply of a bowl and float mechanism, with a passage to a nozzle located directly in the path of the ingoing air. Obviously, that is the bare outline of a present-day carbureter, and yet the Maybach gave fairly satisfactory results, though, of course it had an extremely high grade of gasoline to work with.

In due course engine designers realized that something more was needed in the carbureter, if really efficient results were to be obtained. About 1902, I think, a French carbureter, known as the Krebs (suspiciously un-Gallic, that name), introduced the auxiliary air valve as a part of the device. This helped, as it tended to even up the supply of air with the flow of fuel, which in the earlier type had been out of proportion.

This early improvement on the original type had a spring-backed air valve in a separate air line, making twin air openings. In this way, as the engine speed increases the suction on the nozzle increases, but when a certain point is reached the extra air valve opens, admits more air and thus thins the mixture, tending to keep the mixture constant. This Krebs type, with numerous variations, is still a popular design.

Are in Four Groups.

When we come to examine modern carbureters we find that they fall fairly readily into four groups or classes, somewhat as follows: The auxiliary air valve type, the metering pin type, the multiple jet type and the multiple throttle or progressive type. Beyond this there are some instruments that cannot readily be placed in any of these classes, and yet they do not form a distinct class themselves; they are simply odd fellows.

Of course, as might be expected, many of the instruments have characteristics of more than one class. Thus the older type of Stromberg and the Browne are auxiliary air valve instruments; the Rayfield, the new Schebler and the H. & N. are metering pin carbureters; the Zenith Holley and new Stromberg are compensating jet types, while the Master and Juhasz are progressive types.

The air valve types in use today are not very different from the original devices, although there have been a few interesting variations. The action of this type, as we have already explained, is simply the spring backed valve, to admit more air as need arises.

The new Schebler carbureter is perhaps as good an example of the metering pin type as we could ask. This employs a spring-backed auxiliary valve, interconnected with the needle valve, so that as the air valve opens, admitting more air, the needle valve opens, admitting more fuel. The openings are proportioned with great nicety, so that the tendency is to feed an even mixture throughout the entire speed range. Adjustment in the Schebler is very simple, consisting of a cap above the air valve, turning which clockwise makes the mixture richer by lifting up the air valve, while turning in the opposite direction thins the fuel.

The Juhasz is a good example of the progressive type of instrument, which has three upright jets, with a rotary throttle above them, comprising three openings at different points. At low engine speeds one of these openings is above one of the jets, the other two being out of operation. As the speed increases, another jet is uncovered, and finally the third also is brought into play, while an air valve automatically feeds air into the middle chamber.

Zenith Is Example.

The Zenith is an excellent example of the compensating jet type. In this instrument the ratio of gas to air is maintained throughout the entire speed range by means of a compensating nozzle, designed to contract the richer mixture fed by the regular nozzle. The main jet of this instrument has around it another, which communicates with a well fed from the float chamber and is known as the compensator. The inner jet is fed directly from the float chamber.

The fuel flowing through this one is in direct proportion to the suction, just as in the old single jet carbureters. The well in the line of the outer jet keeps the flow here exactly even all the time, but since the rush of air increases with the speed, this jet tends to give a weaker mixture at higher speeds. Of course, the inner jet governed by the suction tends to give a richer mixture at increased speeds. Thus the two compensate for each other and give what is claimed to be an exactly proper mixture at all speeds.

Practically all carbureters in use today have some means of controlling both air and fuel supply. By means of adjustment it is possible to cut down the amount of air admitted and similarly the amount of gasoline may be restricted or increased as the need may be. It has been said, not without reason, that one of the prime faults of American motor car owners of today is feeding too rich a mixture. It is important, therefore, the carbureters should be properly adjusted.

Should Adjust With Care.

In this connection readers should be warned to make all adjustments slowly and carefully. If the car owner is not sure whether the mixture is rich or lean he should open the throttle about one-quarter and then for a few seconds reduce the air flow with his hand. If the engine shows signs of picking up it may be taken as a sign that the quantity of air should be diminished.

On the other hand, if the engine slows down it indicates that more air is needed instead of less. In making adjustments give each one a chance to demonstrate its usefulness before trying another. As a matter of fact, the car should be run under service conditions on each adjustment to see how it affects the running. Experiments made while the engine is idling are not very satisfactory, and may not prove right at all under actual running conditions.

While our present carbureters are, as I mentioned in the beginning, pretty efficient instruments, nevertheless they are handling a remarkably low grade of fuel and they will have to tackle even worse before they get through. This means that the fuel is hard to carburate and any instrument needs the assistance of a certain amount of heat in handling this debased fuel.

Devices which feed heated air to the carbureter are to be had in numbers and every carbureter ought to be so fitted. The expense is very small and the help to the carbureter is worth while. In fact, these devices will pay for themselves many times over in the saving of gasoline that they effect. The hot spots in the manifold, which were a feature of last season's accessory offerings, also assist the carbureter in its function of providing the engine with a thoroughly predigested food.

The gradually lowered quality of the motor fuel has caused certain changes in design that have had their effect on carburetion. Instead of the long external manifolds of a few years ago we now have very short manifolds or none at all, that is to say, none exposed, the passage being included in the cylinder casting, a construction which tends to heat the fuel and make it more readily vaporized. Car owners who have engines fitted with the old-fashioned sweeping external manifolds will undoubtedly have trouble with condensation of the fuel in the manifold.

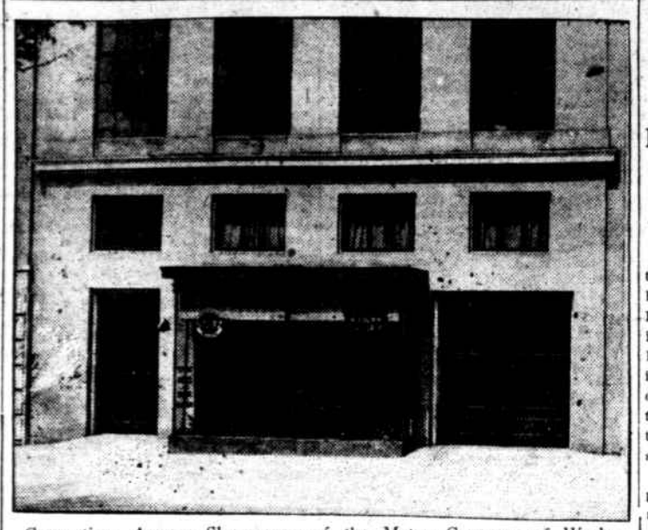
Heating Device Needed.

This will produce dripping when the car is standing. Any car having an engine fitted with one of these old-fashioned manifolds should be fitted with some heating device, for it will be almost impossible to get efficiency in any other way. The best carbureter has trouble in handling present day fuel even with everything in its favor and with long, cold passages for this heavy liquid to pass through and condense in it is almost impossible to hope for satisfactory operation.

The carbureter needs little attention from the average owner. The strainer, which is included in the fuel line, must be removed and cleaned from time to time and it may surprise some neophytes to find plenty of rust and dirt in this catchall. If the strainer is not cared for enough foreign matter will collect to stop the flow of fuel. Further than this, the tank cock should be opened every couple of months, and any water should be drained out.

As a general rule, when serious trouble develops in the carburetion system the best thing to do is to drive over to the service station on the first opportunity and get the expert there to give the instrument a looking over. The carbureter, after all, is a delicately tuned instrument and unskilled tinkering may work considerable injury and cause almost endless trouble. On the other hand, I would advise any owner to study the instrument that is used on his car, so that he can make any adjustments or repairs or find any trouble that may develop. You never can tell when this special knowledge may come in handy.

HOME OF STUTZ AND AUBURN



Connecticut Avenue Showrooms of the Motor Company of Washington, Connecticut and Rhode Island Avenues, Distributors for the Stutz and Auburn.

IRISH CAR OWNER WAXES ELOQUENT OVER HIS CADILLAC

Favors U. S. Auto Over British Makes Owned At Same Time.

The enthusiasm of an Irish owner of the Cadillac fairly bubbles forth in a communication signed by J. C. McC. which was recently printed in The Car, a prominent English motoring journal.

J. C. McC. says that he is now driving his third Cadillac, and that the fact that he has concurrently owned three English cars of first-class make may justify the confidence which he feels in his American cars.

At the London show in 1912, he came to the conclusion that no car, British or foreign, came so near to his ideal as the then four-cylinder Cadillac, and first became a Cadillac owner. His second Cadillac was sold to the Russians for war use, and he saw his third unloaded at Liverpool shortly after the end of the war.

"I did not look forward to central gear-change with any pleasure," he writes, "and so obstinate was I on this point that I had almost decided to select some other make rather than accept the new position. In the end, fortunately for myself, I now think, I waived this point. Whatever may be the case with other cars, the inconvenience, if any, is entirely negligible on a Cadillac, since in normal circumstances one may go the whole day, even traffic driving, scarcely ever needing to touch the gear lever. I have walked beside my car on top gear, and on a smooth level road it can be started on top.

"Being doubtful of the reliability of electric starters, I remember at first a constant dread in looking forward to what I thought the inevitable time when I should have to depend on my muscles to start my engine. I never did it! And when I reflect that I never heard of a man who can 'swing' a Cadillac 'Eight,' with normal compression, I think I have reason to thank the invariable dependability of the electrical plant with which these cars are provided.

"My experiences on a recent expedition may not be out of place, as indicating the feeling of confidence one acquires in this make, and its usefulness for heavy work. Before Christmas last it was quite on the cards that the small number of trains then left running in this country would shortly cease. On some main lines not a passenger or goods train had moved for upwards of six months. Living in the south of the country, with two girls at school in Darlington, and a boy in the County Down, it was a problem how to get them home for the holidays. With my remaining boy, a lad of 8, we started for the North, over snow-covered roads the whole way.

INTERESTING DATA ON TIRE IMPACTS FURNISHED PUBLIC

Findings of Bureau Experts Summarized in Publication.

Of great interest alike to motor truck owners and Federal and State highway officials is a report by Earl B. Smith, senior assistant testing engineer, Bureau of Public Roads, Department of Agriculture, in the last issue of Public Roads, dealing with comparative impact forces of solid and pneumatic truck tires when they encounter small obstructions.

The findings of the bureau experts, as summarized by Smith, are as follows:

Impact depends largely upon the kind and condition of the tire.

Thin or worn solid rubber tires, even though they be very wide, produce very high impact forces.

Pneumatic tires offer the greatest influence in reducing impact forces, and with their use the impact increases only very slightly with the speed of the truck.

Cushion tires, that is, tires having a degree of softness and deflection between solids and pneumatics, offer corresponding advantages in reducing speed.

Impact increases with the speed of the truck, but it cannot be said to increase according to any constant ratio or power of the speed.

Although heavy unsprung weight may give higher impact than lighter unsprung weight, it cannot be said that this is the major controlling factor.

The relative destructive effect produced by light-weight, high-speed trucks and heavy, slow-moving trucks, has not been determined by these tests. They do, however, indicate that equal impact may be obtained under some conditions.

Impact may be as high as seven times the static load on one rear wheel when a solid-tired truck strikes a one-inch obstruction at sixteen miles per hour, an average value being about four times. For pneumatic tires the maximum impact value is probably not more than one and three-fourths times the load at one rear wheel, and an average value is not more than one and one-fourth times the load.

Practical Paragraphs.

New Rings and Oil Leaks.

It frequently happens that after new piston rings have been installed for the express purpose of stopping oil leaks the condition continues just the same. It may be necessary to lap in the rings for a really satisfactory job. If the cylinder has been worn out or round it will be necessary to fit the ring to the altered shape and lapping is necessary.

Brake Adjustment.

When the car owner has installed on his vehicle a winter body of any type he should remember that he has added considerable weight to the vehicle. For this reason it is necessary that he carefully adjust the brakes to care for the added burden. Neglect of this obvious precaution causes many minor rear end collisions in city driving and many contribute to serious accident.

Ingenious Foot Rest.

Few veteran drivers need to be told how much comfort results from the installation of a foot rest just behind the accelerator pedal, so that the arch of the foot is supported. Not only does this prevent leg strain but it actually makes for more delicately responsive control of the accelerating function. An admirable foot rest of this kind may be made by cutting through a section of a wornout tire and fastening it to the floor boards with small screws driven through the beads.

Weight and Pressure.

We hear a great deal of discussion on the subject of weight as related to tire pressure. Every car owner knows it is bad for the tires to force them to carry more weight than they were intended to bear. Unfortunately it is not always possible to avoid overloading the car, nor can the driver be expected to weigh each passenger and then jump up his casings to meet the demand about to be made on them. When it becomes necessary to carry extra weight let the car be driven slowly, with all due care to avoid unusual bumps and a temporary overload will probably result in no damage to the tires.

Inserting the Tube.

When inserting a new inner tube or replacing the old one which has been repaired, the inside of the casing should first be wiped out with a damp cloth to remove any sand or grit that may be present. A single sharp pointed grain of sand between the casing and the tube is very likely to force its way through the tube, causing the puncture. This is the real cause of many a mysterious puncture.

Pressure Feed Failure.

It sometimes happens on cars where fuel is fed by pressure supplied by the exhaust gases is becomes increasingly difficult to maintain the pressure at the requisite figure. As a rule, pressure does not drop quickly, but seems gradually to ooze away. The first thing to do in a case of this kind is to examine the filler cap of the tank.

A leather or rubber gasket is used at this point, and often the rubber becomes spongy or the leather gets hard and caked, or a small bit of foreign matter may have lodged between the cap and its seat. On the other hand, it sometimes occurs that the pressure in the system is built up to a point where the small valve operated by the carbureter float will be unable to restrain the fuel, and flooding of the instrument will result. As a rule, a pressure of one and a half pounds is ample to insure an uninterrupted supply of fuel in the carbureter.

Valve Stem Leakage.

Leakage around the stems of the intake valves usually manifests itself in a falling off in power, difficult starting and misfiring at small throttle openings. A makeshift remedy lies in fitting the valve stem guides with some form of lubricant retaining means. This may be either a series of narrow grooves cut in the valve stem and into which a graphite and oil paste has been rubbed, so as to fill them, or stuffing boxes may be fitted at the outer end of the guides. This latter is the more permanent and satisfactory job in that, should the guide wear considerably, the nut may be drawn down upon the packing, thereby preventing leakage.

Carbureter Adjustments.

A great many car owners make the mistake of adjusting the carbureter when the engine is cold. Now it is always best to make adjustments to the motor after it has been run for long enough to get thoroughly warmed through and this applies equally to the valve tappets, etc. It is quite possible that the cold motor may operate very well on certain adjustments that will not agree at all with the hot engine.

BRAKE CORRECTION CALLED BIG NEED OF AMERICAN AUTOS

Faults Apparent, but No Attempt Ever Made at Remedy.

We confess to a distinct lack of progressiveness when we admit, as we do, that the brakes on the average car are not as good as they ought to be. As a whole, American cars show poor brake layouts, and no attempt is made from year to year to correct the faults. The average driver must reline the brakes of his car once a year or so, and the cost is more than it ought to be. We should have more effective brakes, brakes that last longer without requiring lining renewal and the cost of replacing the lining should be a matter of a few dollars. As a driver on the road you know that there is evidence sufficient to show the inefficiency of some brakes. You know also, that in your own car, perhaps, loud squeaks and chattering attest to some faults in the lining of the brake layout.

Some cars, as you know, emit a loud squeak every time the brakes are applied. The driver imagines that it is due to the lining or to the adjustment being wrong, or to some such cause. Fundamentally, it is due to a periodic vibration of the brake bands emphasized by lining whose rubbing surface is glazed or shiny. It may seem rather queer to many, but if this vibration is upset in some simple way the brakes neither squeak or chatter. In one make of car it was found that the vibration could be destroyed by drilling a three-eighth inch hole in the band at a point about two inches from the end.

Varied Noises.

In another make of car it was found that the simple expedient of shifting the band centering device eliminated squeaking and chattering. The chattering is, of course, vibration of a high magnitude and may be set up in the brake bands only under certain conditions. One well known make of car has brake chattering only on reverse, another make chatters in both directions.

Chattering and squeaking in themselves show that the brakes are not doing what they should, for the vibrating bands cannot hope to grip the drum as firmly as non-vibrating ones. It is, therefore, essential that we get rid of this trouble for safety's sake as well as to quiet our nervous system.

Brake bands and the whole braking system ought to be inspected once a month. The writer is of the firm opinion that this ought to be done by some competent State or government agency, for, if it is left entirely to the owner he will make the inspections, but go no further. One must understand the braking system in detail in order to know whether it is in good condition. The matter of making a band adjustment by shortening a lever or a rod is in itself simple, but suppose such an adjustment is made and the brakes do not hold well. The owner must go further. In justice to the owner he ought to know that tight brakes remain so only for a short time. The lining wears itself down and then the brakes need adjusting again. Often the linings will hold along a certain area, leaving much of the lining surfaces out of contact with the drum. In such a case the bands must be reset over the drum so that they are concentric without it, then the pull on the bands brings all braking area into engagement.

Every automobile driver ought to be able to stop his car within a reasonable distance, dependent upon the speed of travel. This will be possible only if the lining always is in good condition and takes hold of the drum all around. In some hilly sections of the country it is quite possible for an owner to burn up brake lining in ten miles of travel if he does not use a little judgment in saving the lining. There should be no occasion for a driver descending a steep grade with the brakes applied firmly in order to hold the car back. Every driver ought to know that by shifting into second or first speed the retarding effort of the engine is brought into play, and even on steep grades the brakes need hardly be used. Under perfect conditions of driving lining ought to last three years instead of one.

The use of lining dopes is not advised, because the majority of them are worthless. The best that the owner can do in caring for the lining on the car is to clean it occasionally with a little kerosene, using a squirt can to get it to the surfaces. A point often overlooked by owners is that oil from the differential housing works its way to the bands, this condition being certain when the housing contains too much lubricant.